MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

PPS0016 – INTRODUCTION TO PROBABILITY AND STATISTICS

(All sections/ Groups)

10th MAR 2017
9:00 A.M. – 11:00 A.M.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of SIX printed pages including the cover page.
2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.
4. Statistical table is provided.

Question 1

(a) Categorise the followings into discrete or continuous data:

Number of rulers	Number of cars	Height of students
Distance between 2 cities	Color of cars	Time for travelling
Cost of a drink	Postcode of an area	Set of words in a paragragh
Temperature of the days	Width of the houses	Thickness of books

[6 marks]

(b) The 30 records listed below are taken from the measurement of heights of a type of plant in centimeters: -

48	64	58	94	62	99	74	94	70	83
81	93	41	69	57	91	66	62	97	61
57	78	67	51	64	63	98	89	74	95

(i) Construct a **frequency distribution table** using 40 as the smallest value for the lowest class. Use Sturges' formula to estimate the number of classes (round to the nearest integer). The table should also contain the class limits, class boundaries, midpoints, frequencies, the cumulative frequencies, midpoint times frequency(mf) and m^2f.

[7 marks]

(ii) How many percent of the plants is with the height ranging from 70 to 79?

[2 marks]

(iii) Sketch an **Orgive** for the frequency distribution.

[5 marks]

(iv) Estimate the **mean** and **standard deviation**.

[5 marks]

Continued ...

Question 2

(a) Consider the digits 1, 2, 3, 4, 5, 6. How many 4-digit numbers can be formed without repetition if

(i) there are no restrictions?
(ii) they must be multiples of 5?

[2 + 3 marks]

(b) A chess club has 10 members, of whom 6 are men and 4 are women. A team of 4 members is selected to play in a match. Find the number of different ways of selecting the team if:

(i) all the players are to be of the same sex,
(ii) there must be an equal number of men and women.

[3 + 3 marks]

(c) The table below summarizes the customer statisfaction survey for an online-banking services provided by a bank. The customers are divided into consumer and corporate groups.

	Excellent	Meet Expectation	Need improvement
Consumer	18	38	21
Corporate	10	25	16

(i) Draw a tree diagram and label the probability distribution of each branch.

[7 marks]

(ii) Find P("Excellent").

[3 marks]

(iii) Find P("Meet Expectation" | "Corporate").

[4 marks]

Continued ...

Question 3

(a) A random variable X has probability density function given by

$$f(x) = \begin{cases} kx^3, & 0 \le x \le 1, \\ 0, & otherwise \end{cases}$$

Find the value of k.

[5 marks]

(b) Supposed that a random variable X has a discrete distribution with the following distribution function.

$$f(x) = \begin{cases} cx, & 1, 3, 5, 7, 9, \\ 0, & otherwise \end{cases}$$

(i) Find the probability mass function of X.

[4 marks]

(ii) Calculate the mean and variance of X.

[6 marks]

(c) Suppose the cumulative distribution function of the net weight (in kgs) of packaged milk powder is

$$F(x) = \begin{cases} 0\,; & x < 0 \\ \frac{x}{5}\,; & 0 \le x < 5 \\ 1\,; & x \ge 5 \end{cases}$$

Determine

(i) P(X < 3.1)

[3 marks]

(ii) P(0.3 < X < 4.5)

[4 marks]

(iii) P(X > 4.1)

[3 marks]

Continued ...

Question 4

(a) A company pays its salemen an average of RM350 commission for a car sold to customers with a standard deviation of RM50 due variation in discounts. If the commission pay out is normally distributed,

(i) What is the probability that the salesman receive commissions between RM320 to RM380 for the sales of a car?

[4 marks]

(ii) What is the probability that the salesman receive RM400 or more for every car sold?

[4 marks]

(iii) What is the probability that the salesman receive within RM40 from the average?

[4 marks]

(b) The average typing errors per 5 pages is 4. If typing errors occur according to Poisson distribution, find the probability that:

(i) in 5 pages, there are 3 typing errors

[3 marks]

(ii) in 5 pages, there are at least 2 typing errors

[3 marks]

(iii) in 5 pages, there are less than 5 typing errors

[3 marks]

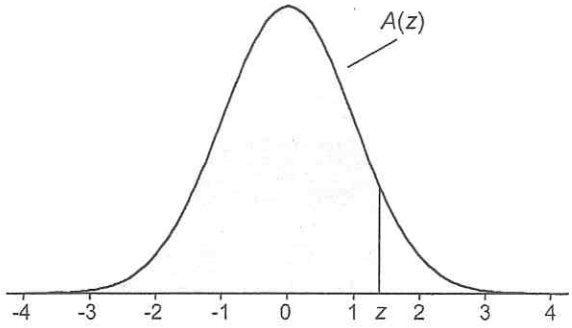
(c) Suppose that we know 70% of MMU students own a car. If 150 students are chosen, how likely is it that we will find at least 65% of them own a car?

[4 marks]

End of Page

TABLE A.1

Cumulative Standardized Normal Distribution



$A(z)$ is the integral of the standardized normal distribution from $-\infty$ to z (in other words, the area under the curve to the left of z). It gives the probability of a normal random variable not being more than z standard deviations above its mean. Values of z of particular importance:

z	$A(z)$	
1.645	0.9500	Lower limit of right 5% tail
1.960	0.9750	Lower limit of right 2.5% tail
2.326	0.9900	Lower limit of right 1% tail
2.576	0.9950	Lower limit of right 0.5% tail
3.090	0.9990	Lower limit of right 0.1% tail
3.291	0.9995	Lower limit of right 0.05% tail

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999							